

Towards a Measure of Accessibility for Rural Gates

Shail Patel ¹ 24 Sep 2024

1. Introduction:

The idea of a time comparison between disabled and non-disabled people is central to the Equality Act 2010. Disability is defined as having a “*substantial*” ... *negative effect on your ability to do normal daily activities*”, with ‘*substantial*’ defined as:

*“more than minor or trivial, eg it takes much longer than it usually would to complete a daily task like getting dressed”*²

This concept is further defined in the PIP (Personal Independence Payment) Legislation (Regulation 4 (2A)) 2013. It defines a disabled person’s ability to carry out a task as a ratio with an upper limit. It states that this must be done “*reliably, ie safely, to a reasonable standard, repeatedly and in a reasonable time period*”. A “*reasonable time period*” is defined as:

“no more than twice as long as the maximum period that a person without a physical or mental condition which limits that person’s ability to carry out the activity in question would normally take to complete that activity”.³

The PIP legislation is designed to measure a disabled person’s ability to carry out everyday tasks such as washing, eating, moving about and so on. While opening a rural gate is not considered part of the PIP assessment, we note that “*access to the natural environment*”⁴ is considered a “*normal day-to-day activity*”⁵ as defined and protected under the Equality Act 2010⁶.

The legislation leads directly to a measure of the ability of a disabled person to open a rural gate. This can be expressed as: the time taken by the disabled person, divided by the maximum period needed by a non-disabled person under normal circumstances to open the same gate:

$$\text{Ability} = \frac{\text{time taken (disabled)}}{\text{maximum time taken (abled bodied)}}$$

This can be viewed in terms of the accessibility of the gate, rather than the ability of a disabled person, by taking an average calculation across a cohort of disabled people. This gives a Measure of Accessibility for a gate of type G, for convenience let us call it MA(G). This is expressed as: the average of the time taken by disabled people to open a gate of type G, divided by the maximum period needed by a non-disabled person under normal circumstances to open the same type of gate:

$$\text{MA}(G) = \frac{\text{Average (time taken (disabled))}}{\text{Maximum (time taken (abled bodied))}}$$

¹ shail.outdoors@gmail.com, Accessibility Consultant

² <https://www.gov.uk/definition-of-disability-under-equality-act-2010>

³ <https://www.legislation.gov.uk/ukxi/2013/377/regulation/4>

⁴ <https://www.gov.uk/government/publications/outdoors-for-all-fair-access-to-a-good-quality-natural-environment/outdoors-for-all-fair-access-to-a-good-quality-natural-environment>

⁵ https://assets.publishing.service.gov.uk/media/5a80dcc8ed915d74e6230df4/Equality_Act_2010-disability_definition.pdf

⁶ <https://www.legislation.gov.uk/ukpga/2010/15/contents>



This measure is presented here as a conceptual model that is approachable (please see Appendix for worked examples on fictional data). Our goal is to turn this into a scientific measure that is verifiable, principled and grounded in legislation. Much of this straw man discusses the various definitions and refinements that may be necessary. We outline what a pilot study might look like and the steps needed to ensure the results are valid and meaningful.

The advantages of a scientific numerical measure are high. This would be a *relative* measure that could be used to settle issues over what constitutes a hierarchy of gates. Using the PIP limit of “twice as long” we also have an *absolute* measure that tells us whether a gate should be considered (and sold!) as accessible or not.

2. Variability & Definitions

There are many sources of variability in the measure depending on how the gate is installed, the weather, skill level and so on. Some of these are discussed below, and many of them will even out given specific sampling methods and a large enough sample size. Given enough data it may be possible to leverage the literature on the statistical analysis of time completion tasks⁷. A pilot study is needed to determine the stability of this measure and what constitutes a good sample size.

2.1. Level of disability

Clearly the more disabled a person is the longer they may need to complete certain tasks, eg open a rural gate. This variability can be normalised by weighting the results according to the prior distribution of disability across the UK. There are a number of Internationally recognised systems of assessing disability, e.g. the International Classification of Functioning, Disability and Health (ICF)⁸. However these can be complex, so we propose to use the ratings inherent in the PIP and Blue Badge assessments. Most respondents will already be aware of their status in this regard: PIP mobility higher level; PIP mobility lower level; Blue Badge on mobility grounds; and Self-assessed disabled on mobility grounds. The prior distribution in the wider population is available in public documents⁹. An alternative approach is to accept that society should protect and cater for those with the greatest need. In this case a different weighting could be envisaged. A pilot study could look at the sensitivity to different weighting.

2.2. Variety of wheeled aids

There are many different wheeled aids and the same person on a different wheeled aid will take a different amount of time to open a rural gate. There are a number of ways this could be tackled:

- a) Weight results using the prior distribution of different mobility aids
- b) Measure the effect of the device by including *able-bodied* people on mobility aids
- c) Agree on one or more “standard” mobility aids for testing purposes

This will need a pilot study to understand the degree of sensitivity and the potential for solutions. It is worth noting that getting through a gate is a test of both the person and the mobility aid.

2.3. Variety of skill level / Normal

When confronted with a new gate it is evident that a person, whether disabled or not, is likely to take longer to open it than once they have had some experience and even some tips. For both disabled and non-disabled we rely on the phrase: “would normally take ...”. We interpret “normal” to mean after the person has had some experience and reached a repeatable and stable level of competence, whatever that may be for the individual.

⁷ <https://uxpajournal.org/weibull-analysis-task-times/>

⁸ <https://www.who.int/standards/classifications/international-classification-of-functioning-disability-and-health>

⁹ <https://disabledramblers.co.uk/wp3/wp-content/uploads/2022/08/NotEnoughWheelsFinal.v.2.2.pdf>



2.4. Installation and location

The installation and environment around a gate can affect how easy it is to get through exactly the same manufactured gate in different locations. Again we rely on the word “normal” to indicate there is nothing difficult or different about the installation or location, and suggest ruling out any gates that have any particular issues. We are measuring the gate not its installation. If necessary it may be possible to define a “standard” installation, eg according to manufacturer’s specification, or set up a “standard” gate at a test site eg at the COAT site¹²

2.5. Both Directions

For a variety of reasons, many gates are easier to open in one direction than the other. One-way gates only open in one direction so for these gates it is inherent in the design. Many gates have the bolt or latch mechanism on either the right or left hand side and this “handedness” is often awkward and can be impossible for certain kinds of disability. It would be best if a pilot study captured the time taken in both directions, for both disabled and non-disabled people. There are several options as to how to use the data and a pilot study would be in the best position to identify the best.

2.6. Maximum

The PIP legislation uses the phrase “maximum period” without defining precisely what that means. As a working assumption we will take this literally, bearing in mind the use of the word “normal”. Any data that looks like an outlier amongst the able-bodied population should probably be excluded. We also note that some gates, eg A-frames, may be trivially easy for an able-bodied person and may even take less than 1 second. Given that “Maximum(time taken(abled bodied))” appears in the equation as a divisor the ratio will be highly sensitive to small values. It may be useful to propose a minimum value for this maximum, eg a reasonable 5 seconds, so as to avoid near-asymptotic anomalies. A pilot study is necessary to understand this.

2.7. Average

The measure calls for the average of the time taken by disabled people. We discount using the mode or median as they do not sufficiently take into account those disabled people who really struggle with a particular gate: 4 or 5 minutes to open a gate independently is not unlikely, and in many cases people will give up and/or go elsewhere. The mean seems a reasonable statistic to use. However the question arises of how to handle those that cannot get through a gate at all, eg someone with loss of motor control and a RADAR key gate¹⁰, or a person on a 3-wheeler and an A-frame¹¹. It may be worthwhile setting some kind of upper limit, eg 5 minutes, so that a calculation may be made. A pilot study could recommend what this might be.

2.8. Closing the gate behind

We assume that going through a gate includes shutting the gate behind in order to achieve the task to a “reasonable standard”. Where the gate is self-closing this is not necessary. In essence our prime focus is the amount of human time required, rather than the time taken for the gate to close.

2.9. Able-bodied task

We assume that the able-bodied person will go through the gate or barrier that is easiest for them. For example, if the test gate is an easy-latch gate with a stile to one side, the disabled person can go through the easy-latch gate and the able-bodied person can do whichever is easiest for them.

10 <https://www.secure-a-field.co.uk/products/thornton-kissing-gate-with-radar-lock>

11 <https://centrewire.com/products/motorbike-inhibitor/>



2.10. Traffic-light rating

Given the variability one can envisage a traffic-light system of green (less than twice), amber (between twice and some other number), and red (above this other number). This would give bands rather than a possibly false sense of decimal place accuracy.

3. Looking ahead to a pilot study

We envisage a two-stage approach to a pilot study where Stage 1 may be a more informal pilot with the purpose of gaining some insight into the issues above. It would help determine where the key issues are that need to be addressed and make a proposal for further more formal pilot study in Stage 2.

3.1. Video evidence

In both Stages of a pilot study we envisage the use of video data as an easy way to provide verifiable evidence of the time taken. This could be stored in a publicly accessible location and would be particularly useful for identifying outliers. The data gathered should include at least one disabled person and one able-bodied person going through the same gate, at the same location, and on the same day, ie in the same weather and other conditions. It remains to be seen whether this can be most easily organised via a Facebook appeal, a number of organised group rambles, or a test location such as the COAT centre¹².

3.2. Gates to focus on

It is envisaged that an early pre-pilot study would focus on two or perhaps three gates - the initial goal is to test the methodology rather than the gates themselves. It would be best to select relatively common gates that people may encounter in an ordinary ramble.

4. Next Steps

An initial toe dipping exercise using available videos revealed that this approach may be worth pursuing. That said, this document is intended to outline the framework for a measure that is verifiable, principled and grounded in legislation. As such it raises questions rather than answers them. The next step is to set up a pilot study. The above discussion gives some indication as to what it might be useful to consider, and how such a pilot study might be designed and analysed. Central to an initial pilot study will be to analyse the sensitivity of the proposed measure to the various sources of variability, and make recommendations as to how a more formal pilot study might be conducted.

12 <https://www.youtube.com/playlist?app=desktop&list=PLMjpbfdBx8OWoD6IPKjn2rGv1nXumpJ2j&cbrd=1>



Appendix: Worked Examples

Please note these worked examples are plausible, but use fake data on fictional gates. They are designed to illustrate a few of the concepts. Also please note that the calculation method may change following a pilot study.

Example A:

Gate A is designed to be easy to use by disabled people. It works well for many but not for all.

Time taken by disabled people (secs): 11, 13, 9, 15, 12, 39, 8, 14, 53, 7, 8
Mean: 17 secs (rounded to nearest whole number)

Time taken by non-disabled people (secs): 10, 7, 9, 8, 24, 9, 5, 7, 5, 8, 6
Maximum: 10 secs (discounting the outlier¹³ of 24 secs, cf Section 2.6)

Measure of Accessibility $MA(A) = 17 / 10 = 1.7$

Gate A is accessible. It would have a 'green' traffic-light (cf Section 2.10)

It might be worth looking into why a few people struggle and see if something can be re-designed.

Example B:

Gate B is designed to be accessible but to exclude certain types of user. Those that can get through do so very quickly, but some mobility aids cannot get through at all.

Time taken by disabled people (secs): 3, 4, 2, 5, 4, DF, 4, 3, 5, DF, 3, DF, 2
... where DF means not able to finish.

Substituting 5 mins = 300 secs for DF (cf Section 2.7) we have:

Time taken by disabled people (secs): 3, 4, 2, 5, 4, 300, 4, 3, 5, 300, 3, 300, 2
Mean: 72 secs (rounded to nearest whole number)

Time taken by non-disabled people (secs): 2, 1, 2, 1, 2, 2, 1, 1
Maximum: 5 secs (rounding up to the lower limit of 5 secs cf Section 2.6)

Measure of Accessibility $MA(B) = 72 / 5 = 14$ (rounded)

This gate is not accessible despite being easy to use for many. It would have a 'red' traffic-light.

¹³ Formally, with mean of 7.4 and a standard deviation of 1.71, 24 is much greater than the mean plus 3 times the standard deviation of the rest of the data so there is very strong evidence it is an outlier. Viewing the video evidence would also help to understand how this arose.